



# **Open Systems Development Initiative (OSDI)**

## **Open Systems Project Engineering Conference (OSPEC)**

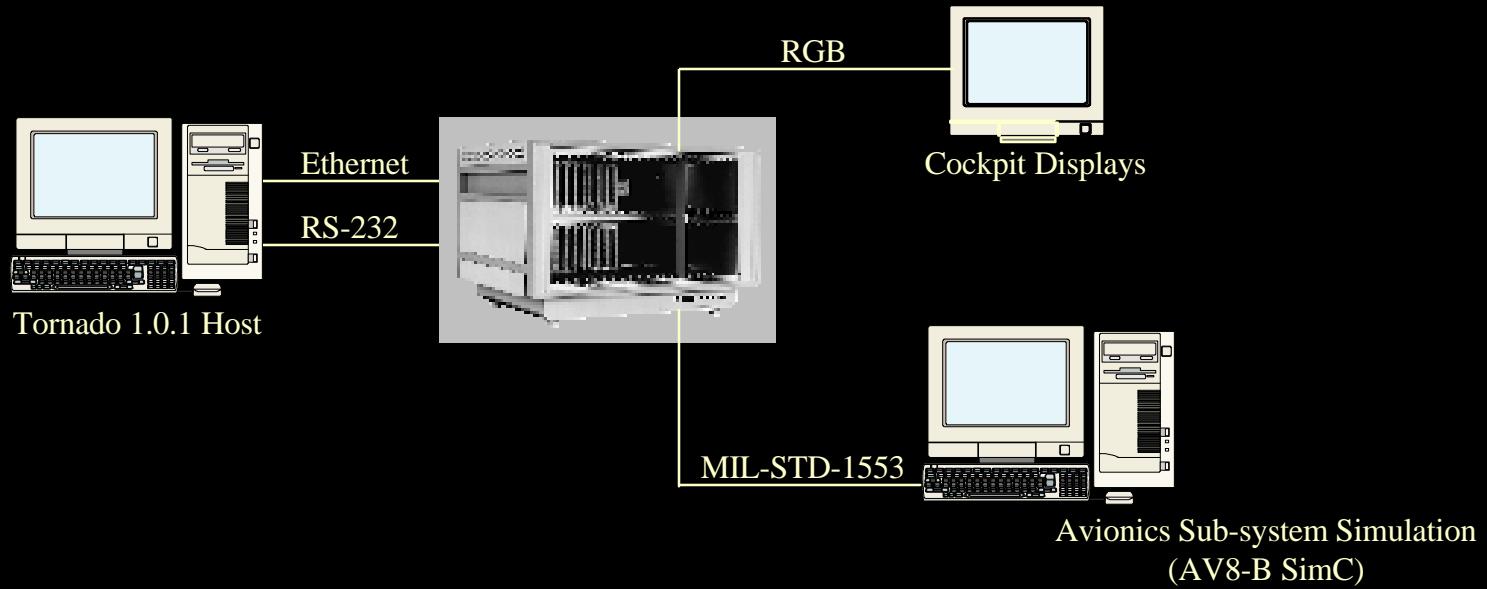
### **FY 98 Status Review**

### **29 April - 1 May 1998**

**John T. Paul**  
**Naval Air Warfare Center - Weapons Division**  
**China Lake, CA**



# *Open Systems Development Initiative*





# Goals

COTS technology

Object Oriented S/W

AV8B OSCAR

F/A-18 AMC&D

OTHERS

Hands-on expertise in  
a low risk environment

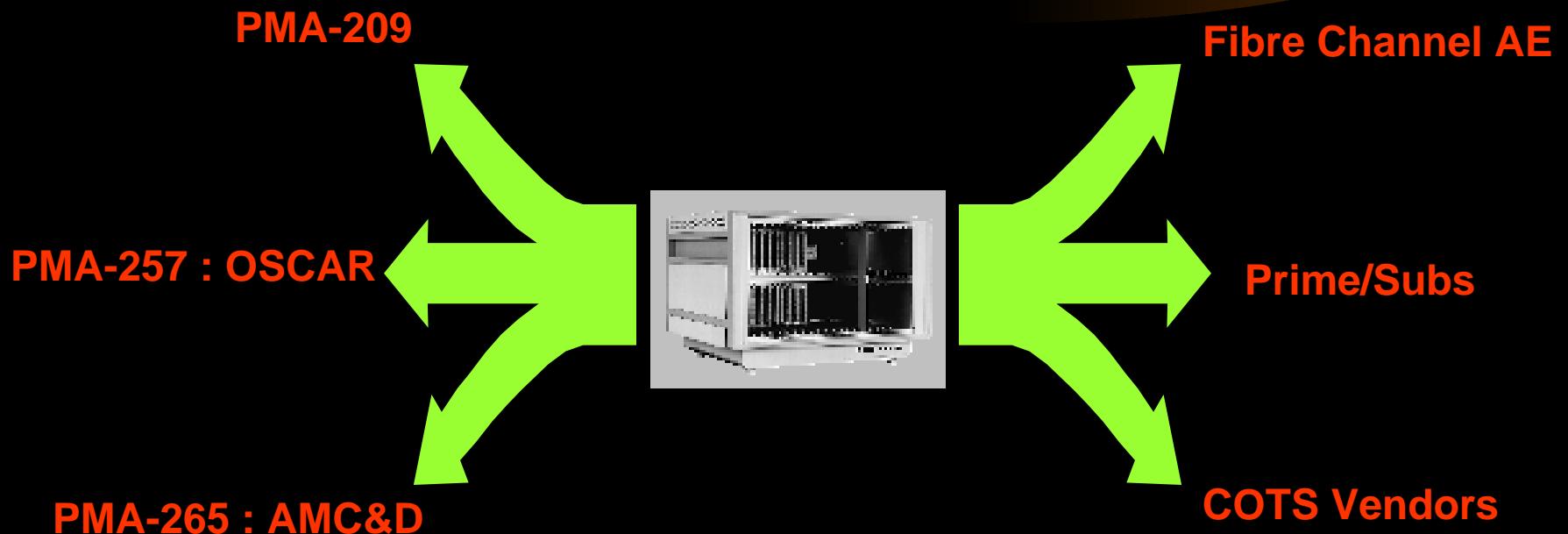
Plug & Play capabilities  
Performance Characteristics

Technology Transfer

In-house OS expertise



## *OSDI Relationships*



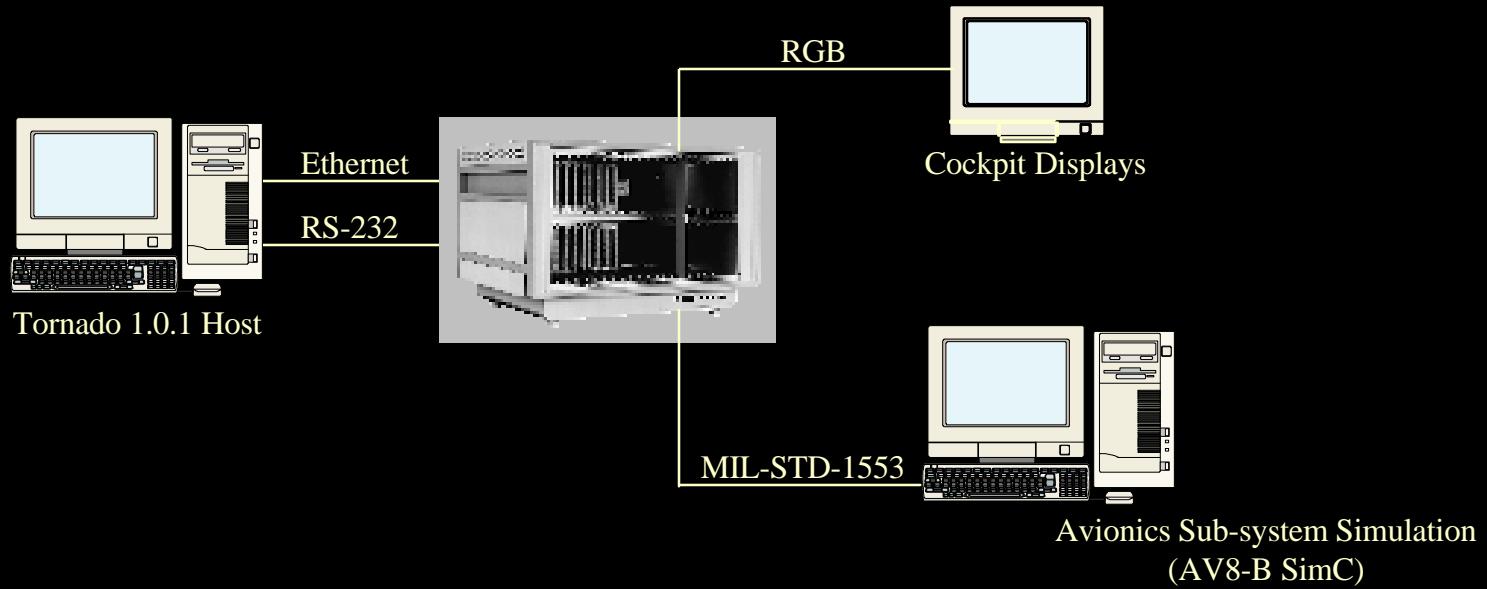


# *Architecture*

- Operational Architecture - Description of the operational elements, assigned tasks, and information flows.
- Systems Architecture - Defines the physical connection, location and identification of key components, circuits, networks etc., and specifies system and component performance parameters.
- Technical Architecture - Identifies the services, interfaces, standards, and their relationships.

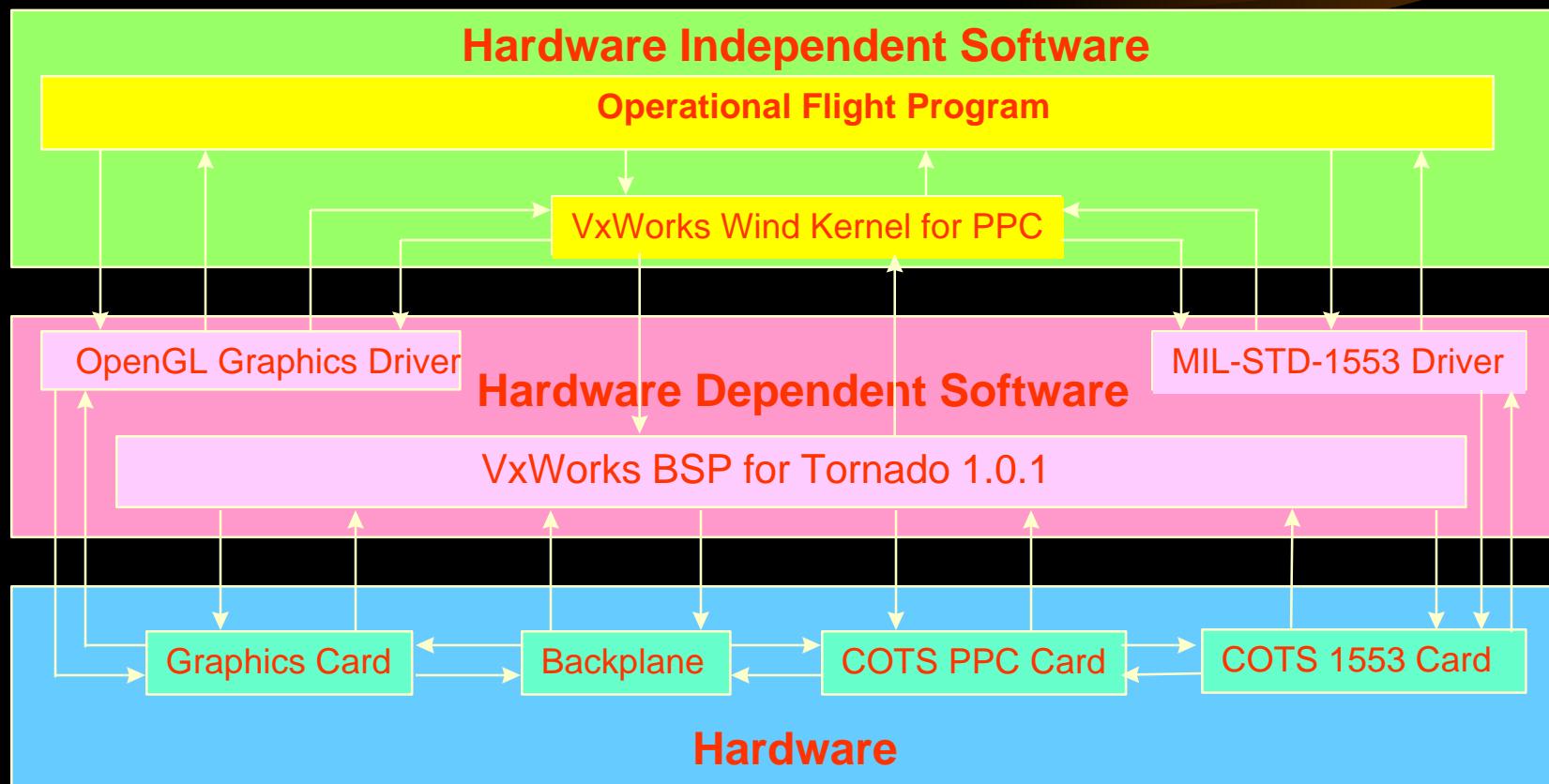


# *OSDI System Architecture*



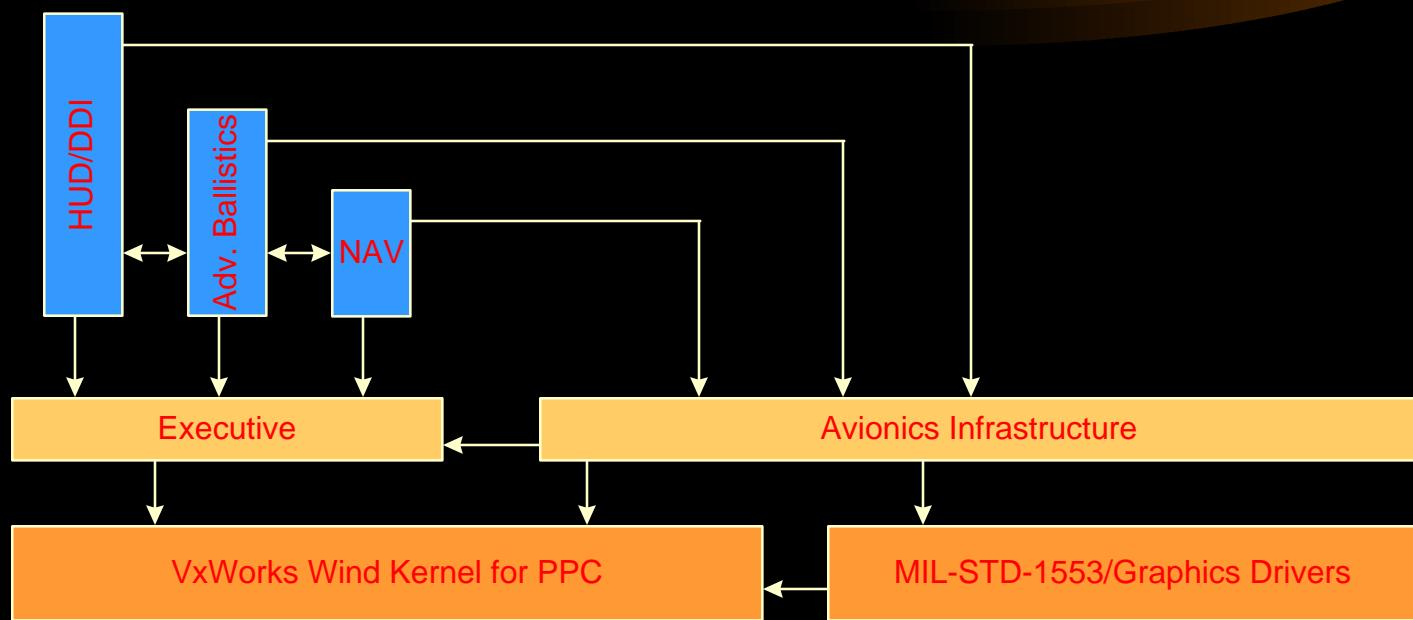


# OSDI Technical Architecture



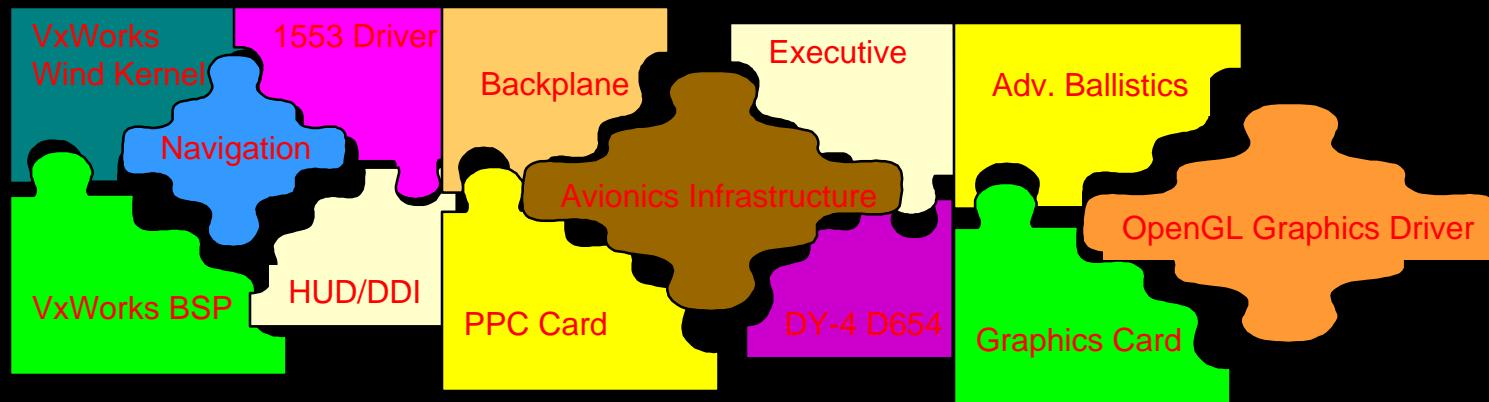


# OSDI S/W Architecture





# *OSDI Components*





# *Standards & Conformance*

## Standards

- National Body
- Company Proprietary
- Non-Standard
- Implementation

## Conformance

- Strict
- Conforming
- Conforming with extensions
- Non-conforming



# Identify Interfaces

	VxWorks Kernel	VxWorks BSP	1553 Driver	Backplane	DY-4 SVME-171	DY-4 D654	Executive	Avionics Infr.	Navigation	Adv. Ballistics	HUD/DDI	Graphics Card	Graphics Driver
VxWorks Kernel	X	X					X	X					X
VxWorks BSP	X			X	X	X							
1553 Driver	X							X					
Backplane		X			X								X
DY-4 SVME-171		X		X		X							
DY-4 D654		X			X								
Executive	X							X	X	X	X		
Avionics Infr.		X		X			X		X	X	X		X
Navigation							X	X		X			
Adv. Ballistics							X	X	X		X		
HUD/DDI							X	X		X			
Graphics Card				X									X
Graphics Driver	X							X			X		



# Identify Key Interfaces

	VxWorks Kernel	VxWorks BSP	1553 Driver	Backplane	DY-4 SVME-171	DY-4 D654	Executive	Avionics Infr.	Navigation	Adv. Ballistics	HUD/DDI	Graphics Card	Graphics Driver
VxWorks Kernel	X(1)	X(2)					X(3)	X					X
VxWorks BSP				X(4)	X(5)	X							
1553 Driver								X(6)					
Backplane				X(7)								X(8)	
DY-4 SVME-171					X(9)								
DY-4 D654													
Executive							X(10)	X(11)	X(12)	X(13)			
Avionics Infr.								X(14)	X(15)	X(16)		X(17)	
Navigation									X(18)				
Adv. Ballistics										X(19)			
HUD/DDI													
Graphics Card													X
Graphics Driver													



# *Key Open Standard Interfaces*

	VxWorks Kernel	VxWorks BSP	1553 Driver	Backplane	DY-4 SVME-171	DY-4 D654	Executive	Avionics Infr.	Navigation	Adv. Ballistics	HUD/DDI	Graphics Card	Graphics Driver
VxWorks Kernel	X(1)	POSIX				POSIX		X					X
VxWorks BSP				VME	EABI	X							
1553 Driver								X(6)					
Backplane				VME							VME		
DY-4 SVME-171					MaxPack								
DY-4 D654													
Executive							X(10)	X(11)	X(12)	X(13)			
Avionics Infr.								X(14)	X(15)	X(16)		OpenGL	
Navigation									X(18)				
Adv. Ballistics										X(19)			
HUD/DDI													
Graphics Card													X
Graphics Driver													



# The KOSI List

	KOSI Component	Standard/Non-Standard	Conformance Level	Responsibility
X(1)	VxWorks Kernel - VxWorks BSP	Non-Standard		DY-4
X(2)	VxWorks Kernel - 1553 Driver	POSIX	IEEE Strict	DY-4
X(3)	VxWorks Kernel - OFP Executive	POSIX	IEEE Strict	OSDI/DY-4
X(4)	VxWorks BSP - Backplane	1101.2 VME	IEEE Strict	DY-4
X(5)	VxWorks BSP - DY-4 SVME-171	EABI	ANSI Strict	DY-4
X(6)	1553 Driver - Avionics Infrastructure	Non-Standard		????
X(7)	Backplane - DY-4 SVME-171	1101.2 VME	IEEE Strict	DY-4
X(8)	Graphics Card - Backplane	1101.2 VME	IEEE Strict	Radstone
X(9)	DY-4 SVME-171 - D654	MaxPack	Proprietary/Unknown	DY-4
X(10)	OFP Executive - Avionics Infrastructure	.h(implementation)		OSDI
X(11)	OFP Executive - Navigation	.h (implementation)		OSDI
X(12)	OFP Executive - Advanced Ballistics	.h (implementation)		OSDI
X(13)	OFP Executive - HUD/DDI	.h (implementation)		OSDI



# *The KOSI List*

Note: Header files are facades(a design pattern) that define critical software interfaces.



# *Benefits of KOSI Analysis*

- Understand key interfaces & standards
- Non-conforming interfaces
- Standardization Vs. Optimization
- KOSI based product selection
- Valuable tool for system engineers



## *Benefits of KOSI Analysis*

- Promotes technology insertion for increased throughput and memory requirements
- Reduced time-to-market
- KOSI based system is scalable, portable, interoperable, & plug & play compatible
- System kept “open” indefinitely

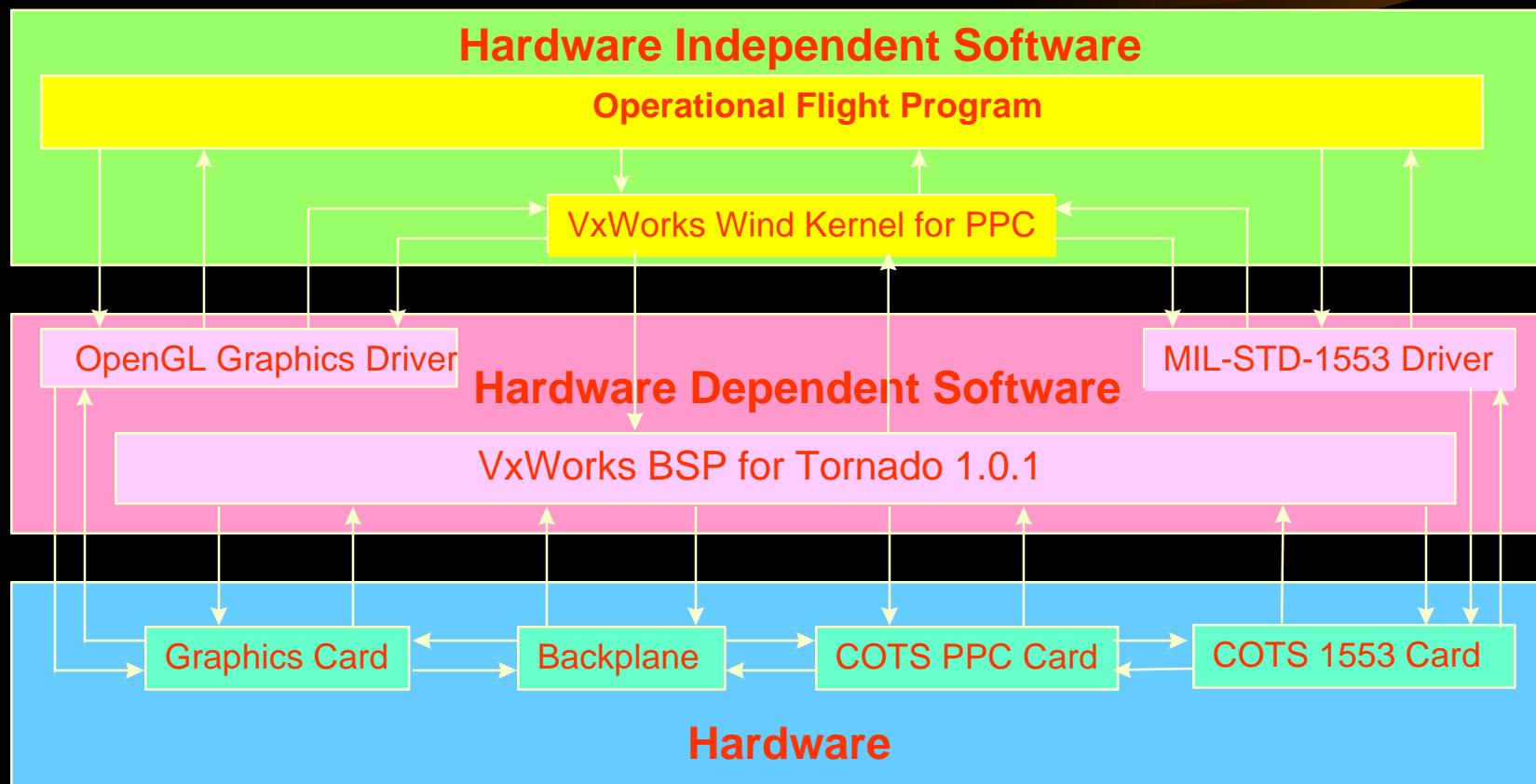


## *Recommendation #1*

- Every new open system procured for the DoD shall have KOSI analysis as a SOW requirement
- KOSI analysis shall be performed by a joint team of prime, subs and DoD
- KOSI analysis shall be controlled and changes tracked through the life of the system

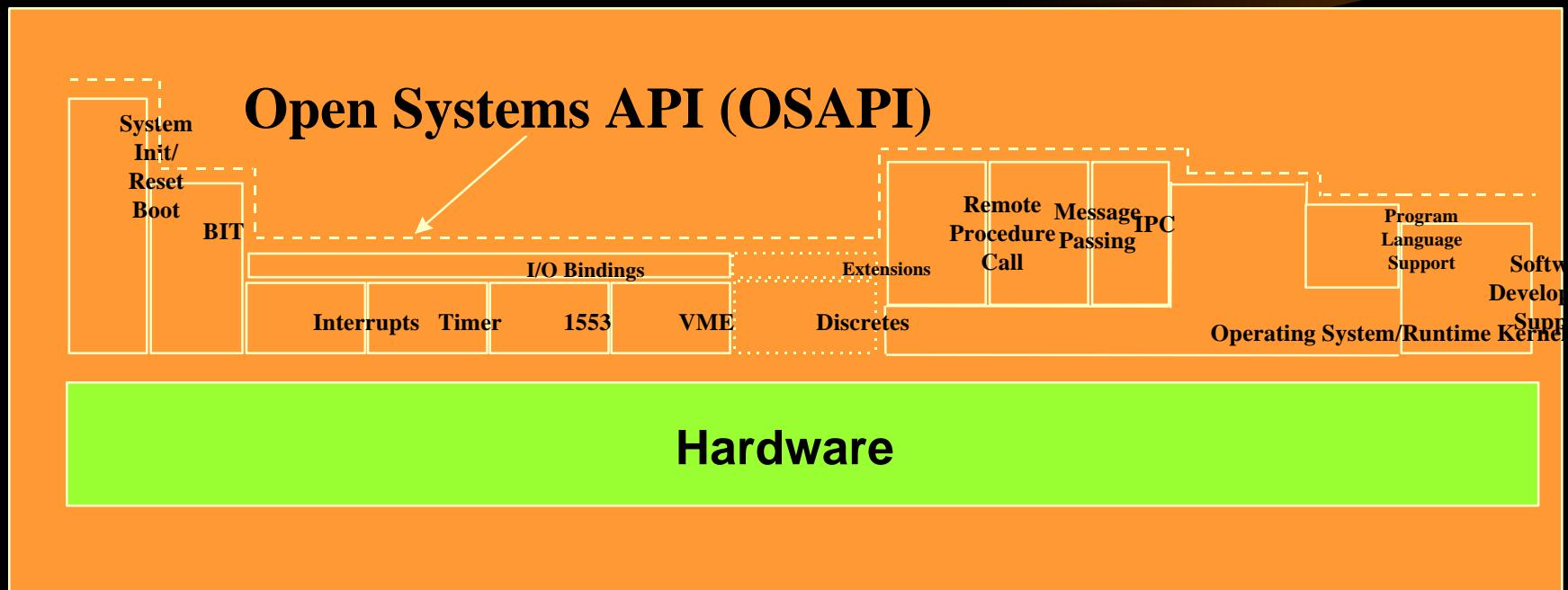


# OSDI Technical Architecture





# Typical OS Technical Architecture



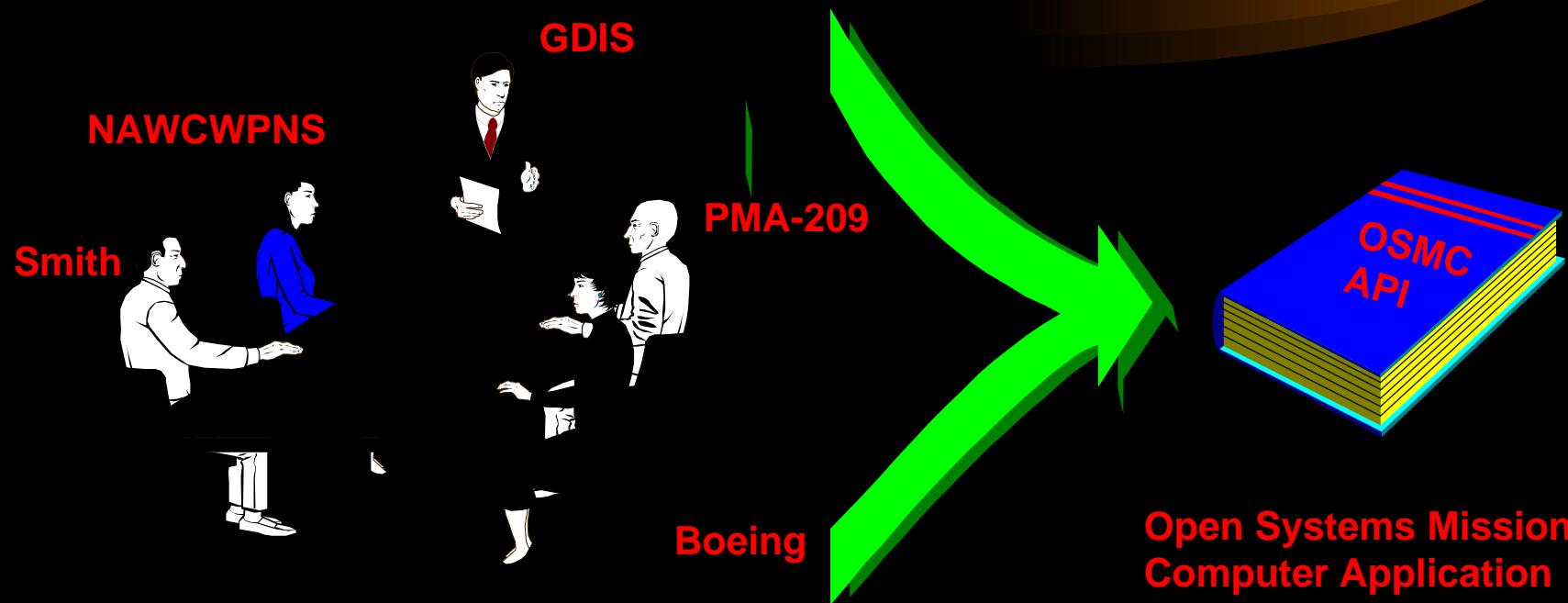


# *Generic API Services*

- System Initialization & Boot Loader
- Built-In Test (BIT)
- Device Drivers
  - Interrupt
  - Timers
  - Backplane (VME)
  - Legacy I/O (1553)
  - High Speed I/O (Fibre Channel, PCI, SCI)
  - Discrete I/O
  - Bindings
- Operating system/Kernel
- Programming Language Runtime Support
- Software Development Interface



# *OSMC API - A Joint Venture*





## *Recommendation #2*

- Joint Review of OSMC API
- Develop OSAPI Specification
- Encourage vendors to voluntarily embrace OSAPI
- Validate COTS product conformance to OSAPI



*Questions*

**It Depends**